

THE REVIEW

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No. 6

Grain Size and Properties Can Be Correlated

Microscopic Examination Is Responsible for Such Accurate Correlation, Vilella Relates

By F. A. Pease

New Jersey Chapter—Metal Congress lecturer, author and well-known metallographist J. R. Vilella, U. S. Steel Corp., Kearny, N. J., presented the March meeting subject "Grain Size and Grain Growth."

The general interest shown in austenite grain size and grain growth in plain carbon steel has been due principally to the accurate correlations of physical properties and the above factors as revealed by microscopic examination.

The formation of austenite in such steels is the result of the attainment of a temperature (approximately 1340° F.) at which iron carbide and ferrite react with each other. This reaction (austenitization) begins at the carbide and ferrite interface, and after complete solution of iron and carbon as well as other elements, the austenite grains grow from the original nuclei to their final grain size, that size being largely dependent upon the maximum temperature attained prior to cooling.

Variation in austenitic grain size exerts profound influence upon the

(Continued on page 8)

Steel Mill Inspection Includes Special and Standardized Tests

By J. Z. Briggs

New York Chapter—N. L. Deuble, metallurgical engineer of Republic Steel Corp., spoke on "Metallurgical Inspection" on May 9 at the last meeting for the 1937-38 season.

There is a normal variation in chemical composition throughout the ingot, but these differences are not marked in the final product.

The grain size, as determined by the McQuaid-Ehn test, is a factor in determining the response of any grade of steel to heat treatment. It is recommended that all specimens be given a normalizing treatment at 1700° F. before the McQuaid-Ehn test, since results may be affected by prior heat treatment or cold working.

Although much work is being done on hardenability, there is as yet no standard test.

Cleanliness is determined by comparison with standard inclusion charts set up by the customer. The deep etch test gives information on dendritic structure, segregation, cracks, pinhole porosity, flakes, and casting defects.

Besides the above tests and physical property tests, the steel mill conducts many other special tests to meet special customer requirements.

Mr. Deuble concluded his talk with examples of various failures and showed how the causes of these failures can be determined by various tests.

H. J. French of the International Nickel Co. acted as technical chairman for the interesting discussion that followed Mr. Deuble's talk.

Speakers' Table Before the Speeches



Glen C. Riegel (Second From Right) Spoke on "Quality Control in the Inspection of Steel and Cast Iron" at the Meeting of the Chicago Chapter on April 14. Caught by the camera are (left to right) R. G. Roshong and H. S. Van Vleet of the Chicago Executive Committee, Technical Chairman R. K. Bowden talking it over with Mr. Riegel, and Chapter Chairman Elmer Gammeter.

Chicago Hears Riegel

Movie of Tractors Precedes Discussion on Inspection and Testing Methods

By David R. Howerton

Chicago Chapter—The April 14 meeting proved to be not only a technical lecture but also a very entertaining and enlightening evening, packed with good feeling and fellowship.

Following a delicious chicken dinner, devoured by approximately 200 members, Chairman Elmer Gammeter introduced Ray Bowden, manager, Metallurgical Department, Carnegie-Illinois Steel Corp., who acted as technical chairman of the meeting.

After many amusing remarks concerning the new addition to the Bowden family, Mr. Bowden took over the meeting in a grand style and introduced the speaker of the evening, Glen Riegel, chief metallurgist, Caterpillar Tractor Co.

Mr. Riegel introduced his discussion by showing a short talking movie which depicted the important role of tractors in the most extreme operating conditions and circumstances. He then discussed present-day inspection and testing methods used on parts making up massive power machinery.

Many out-of-town members were present for the meeting, including Oscar Baurseheidt, Peoria Chapter chairman; M. L. Fry, Republic Steel, Buffalo; Ed Dixon, Ladist Drop Forge, Milwaukee; Walter Bain, Springfield, and several members from Peoria.

The meeting was brought to a close after the showing of Joe E. Brown in "Earthworm Tractors," a comedy which was enjoyed by all.

Notre Dame Adopts New Constitution and By-Laws

By George E. Stoll

Notre Dame Chapter—The final meeting of the year was held at the University on May 11. Following dinner a business meeting was held during which a new constitution and by-laws were adopted as proposed by the Constitution Committee.

Officers were then elected for the coming year. Their names will be published in a future issue.

The speaker for this meeting was V. N. Krivobok, director of research at Allegheny Steel Co., the topic being "Stainless Steels." Dr. Krivobok's enlightening talk on this subject has been reported in previous issues.

Secretary Visits Ontario; New Officers Are Elected

By J. W. McBean

Ontario Chapter—At the May meeting in Toronto we had the pleasure of a short visit from our genial National Secretary W. H. Eisenman, who spoke in his usual humorous vein.

After the extremely interesting reports from our own secretary and treasurer, which showed a very healthy condition of the Chapter, the new officers were elected.

Guest speaker was E. C. Bain, assistant to the vice-president, United States Steel Corp., and past national president of the A.S.M. His talk on "A Simplified Concept of Hardenability in Steel" has been reported in former issues of THE REVIEW.



Compliments

To Wesley P. Sykes, outstanding authority on tungsten and molybdenum at G.E.'s Wire Works in Cleveland, Howe Medalist and Campbell Lecturer, A.S.M., on receipt of the honorary degree of Doctor of Engineering at Case School of Applied Science.

To U.S. Steel Corp.'s Rufus E. Zimmerman and Carnegie Tech's R. F. Mehl on receipt of the degree of Doctor of Science from Franklin and Marshall College.

To Robert H. Heyer, Armco metallurgist, on the award of the Charles B. Dudley Medal of the American Society for Testing Materials for his paper on "Analysis of the Brinell Hardness Test" presented in 1937.

To Francis T. McGuire, metallurgist for Bendix Products Corp. and graduate student at Notre Dame University, on winning the Hennen Jennings Scholarship for graduate work in metallurgy at Harvard University.

To Robert B. Sosman of U. S. Steel Research Laboratories, special lecturer for the 1938 National Metal Congress, on the award of the degree of Doctor of Science by Ohio State University.

To Harvard's Albert Sauveur on his selection to deliver the Edgar Marburg Lecture of the American Society for Testing Materials on June 29.

Noted Authors Will Contribute To Metal Show

Technical Program Will Feature Symposium on Hardenability, Two Educational Courses

The technical program for the 20th National Metal Congress, to be held in Detroit, Oct. 17 to 21, 1938, will be patterned largely along the lines so successfully adopted in recent years for this annual event.

As in the past, it will feature two special educational courses and a two-day symposium of a dozen or so papers on a special subject, in addition to the 30 or 40 papers presented at daily sessions during the five days of the Congress.

The National Metal Exposition, held in conjunction with the Congress, will be staged in Detroit's Convention Hall. Here the exhibits presented by leading metal manufacturing and fabricating firms promise to be bigger and better than ever, with advance sales of exhibit space already exceeding the total space sold last year in Atlantic City and with only ten booths yet to be reserved.

Five Men Give Lecture Course

Subject of the symposium will be "Effects of Alloying Elements on the Hardenability of Medium and Low Alloy Steels." The list of authors will feature such illustrious names as R. F. Mehl of Carnegie Tech, Dr. Davenport of U. S. Steel Research Laboratories, Carnegie-Illinois's Grossmann, McQuaid of Republic, Jominy, Bates, Kinzel, Wilson, Williams, Sergeson, Burns, Riegel, Luerssen, and Foley.

One educational course, on "Machinability," will consist of five lectures presented daily in the late afternoon by five different experts on various aspects of the subject.

The first lecture on "Physics of Cutting" will be given by Hans Ernst, research director, Cincinnati Milling Machine and Cincinnati Grinders, Inc. Australian born and educated, Mr. Ernst spent eight years with Western Cartridge Co. in research and machine development work, and has been in Cincinnati for the past 12 years.

H. B. Knowlton, who is to give the second lecture on "Machining Wrought S.A.E. Steels, Ingot Iron, Wrought Iron and Stainless Steel," is the author of a book on "Heat Treatment, Prop-

(Continued on page 4)

A.S.T.M. Annual Meeting Will Be Held June 27-July 1

The 41st Annual Meeting of the American Society for Testing Materials will be held in Atlantic City at Chalfonte-Haddon Hall June 27 to July 1 inclusive.

Seventeen technical sessions will be held in addition to the various committee meetings of the Society. A symposium on impact testing is being developed in cooperation with the Welding Research Committee of the Engineering Foundation.

Other features of the meeting will be the President's Address by A. E. White on Tuesday morning, June 28, and the 13th Edgar Marburg Lecture on "The Torsion Test" by Albert Sauveur on Wednesday afternoon.

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Another Suggestion

Offered by a Member to Improve
Usefulness of Chapter Meetings

To the Editor of THE REVIEW

In the May issue of THE REVIEW, we find "An Old Member" suggesting several ways in which, he thought, chapter meetings could be made more profitable and interesting to those who come to hear. The suggestions made are all well worth heeding. To his list I should like to add another.

To many who attend these meetings the period following the formal address is at least as instructive and sometimes much more so than is the address itself. It is then that the guest speaker gives personal attention to the individual who propounds a question on which he is particularly desirous of obtaining information.

It is rarely, however, that such questions and their answers do not have an interest to many others in the audience, who are therefore desirous of hearing both questions and answers.

It is this that prompted me to suggest to those who conduct the meetings that when a question is asked, the chairman or the speaker repeat it first and then proceed to answer it for the benefit of all present.

Oftentimes a front seat listener asks a question which is inaudible and the speaker just as inaudibly answers it directly to the person. During this interval the audience is ignored completely and naturally interest abruptly wanes.

Nothing so effectively kills an otherwise good meeting as to have a period in which only two people hold a conversation with complete disregard for the interest of all others. And a meeting which opened with a flourish and promise of much good to all but which ends in a tete-a-tete leaves many a member displeased and dissatisfied.

Yours for still better meetings!

T. P. HUGHES,
Professor
University of Minnesota

Oregon Awards Student Prize

Elliot R. Peck of the graduating class of Oregon State College was declared the winner of the prize offered to students by the Oregon Chapter for the best paper on a metallurgical subject.

The prize, consisting of a year's membership in the Society and \$10.00 in cash, was presented to Mr. Peck at the last meeting of the season held on May 26. The subject of his paper was "A Study of the Transformation of 0.95% Carbon Steel."

Chicago's First Chairman Honored



Harold F. Wood, Second Chairman of the Chicago Chapter, Presents a Life Membership Certificate to Mrs. Edna Rose, Who Accepts in Behalf of Her Father, Ferdinand Charles Lau, Chairman in 1920. At the speakers' table in the background are (left to right) John L. Burns, Assistant Secretary A. E. Terwell and H. S. Van Vleet of the Executive Committee, Past Chairman Harvey Anderson, Technical Chairman Arthur Clarage, Speaker Norman Stotz, and Chapter Chairman Elmer Gammeter.

War, Relief, Corn Crop, Taxes Fade in
Light of Memorable Closing Meeting

Six Student Groups Are Entertained on Sustaining Members' Night; Stotz Speaks on High Speed Steel; Officers Elected

By David R. Howerton

Chicago Chapter—The Japanese may be ripping the devil out of China, millions may be on relief, the corn crop may be going to the grasshoppers, taxes may be getting unbearable—it may even be spring when a young man's fancy lightly turns to what his gal has been thinking of all winter, but—on the evening of May 12 one of the grandest crowds assembled during the entire year attended the final monthly meeting under the 1937-38 regime.

It was an evening crowded with much activity and many occasions, together with business which was of interest to the entire Chapter.

Occasion first—This meeting was designated as Sustaining Members' Night. The Chicago Chapter is proud of its list of 41 organizations carrying a total of 45 sustaining memberships. This increasing list of memberships is indeed indicative of the value received by the members from the Chapter in the form of educational lectures, metallurgical seminars, and social gatherings.

Occasion second—Attending this meeting as guests of the Chapter were sponsors and students from the technical branches of the colleges and schools in this area. These groups included Prof. W. H. Burger and four students of Northwestern; Prof. A. H. Carpenter and nine students of Armour Institute; Prof. Simon Freed and five students of University of Chicago; Prof. L. S. Haga and 11 students of Lewis Institute; Prof. A. B. Wilder and nine students from the University of Illinois; and Prof. E. G. Mahin and 12 students from Notre Dame.

Harvey Anderson, past Chapter chairman, welcomed and introduced by groups the students with their sponsors. Preceding the introduction, the business of metallurgy as a profession was outlined and in conclusion was neatly described as "nice work if you can get it."

Occasion third—The Chicago Chapter was happy to honor for his continued support and assistance F. C. Lau, first chairman of the Chapter, who served in 1920. H. F. Wood, Chapter chairman in 1921-22, had the pleasure of presenting to Mr. Lau a lifetime membership in the Society.

Because of illness, Mr. Lau was not present and the award was made to his daughter, Mrs. Edna Rose, who received it most graciously for her father.

Occasion fourth—In accordance with the constitution of the Chapter, a nominating committee composed of H. A. Anderson, H. B. Knowlton, and J. F. Calef presented to the members nominees for the 1938 Chapter officers. All nominees were elected without opposition.

Occasion fifth—"The Modern Picture of High Speed Steel," a complete and thorough investigation into the question of tungsten vs. molybdenum high speed steel, was presented by Norman I. Stotz, metallurgical engineer, Universal-Cyclops Steel Co.

Mr. Stotz presented from an economic as well as practical standpoint the possibilities of substitution of the molybdenum types of tool steels for the tungsten types.

Occasion sixth—It was a fitting occasion to climax the very successful year enjoyed by the Chicago Chapter, which has been handled in such a splendid manner by Elmer Gammeter.

With the ending of the year, the Chapter also loses Ken Hobbie as secretary. His excellent closing report presented during the meeting brought to the minds of the entire membership a feeling of security and soundness. This is a direct result of Ken's honest and continued efforts to better the Chapter. The Chapter will ever be indebted to him for his services.

Florida Fish Stories and
Scenery Enliven Picnic

By R. E. Christin

Columbus Chapter—At the annual election and Dutch picnic held at "The Trees" on Saturday, May 21, the Chapter was entertained by two talks on Florida. Dr. O. E. Harder, assistant director, Battelle Memorial Institute, gave a list of "Don'ts on Deep Sea Fishing" and included an experience in which two specimens were caught on one hook (believe this or not!)

The audience did learn how to rent a fishing boat on "double or nothing" basis, which means a fish or no pay. Those interested had better contact Dr. Harder directly so that this reporter won't be implicated in any misunderstanding.

L. H. (Les) Marshall, who heads his own company in Columbus, felt so relaxed after passing over the Chairman's Medal (about a 20-lb. casting) to Ed. Stein, that he entertained with motion pictures in technicolor which illustrated

Flow of Metal
In Rolling Is
Essentially Art

Recent Accumulation of Data
Should Place It on More Scientific Basis, Says Moses

By J. Arthur Reese

Baltimore Chapter entertained National Secretary "Bill" Eisenman at an unusually successful dinner meeting on May 2. Approximately 50 guests and members included past National Treasurer Emil Gathmann and W. J. Joffries, vice-chairman of the Washington Chapter.

Following the meeting approximately 100 members and guests heard Bill Eisenman tell of the national activities and growth of the Society, and enjoyed the humorous stories told as only Bill can tell them.

Election of officers for the 1938-39 season then took place, and after that the speaker of the evening, Louis Moses, superintendent of rail mill and roll department, Bethlehem Steel Co., Sparrows Point, Md., presented a talk on "The Flow of Steel in the Rolling Process."

Mr. Moses presented the principles of metal flow between rolls. Although it is essentially an art, he believes that the accumulation and exchange of data on the subject in the last decade shows a trend to place it upon a more scientific basis.

Components of Flow Named

The application of work on the initial passes to an ingot was compared with the heavier drafts applied at later stages of rolling. A discussion of various methods used in breaking down the ingot into semi-finished products was followed by remarks on the sometimes unpredictable behavior of the bar in both the roughing and later process passes.

The main components of flow were said to be elongation and spread, the lantern slides illustrating means for the control of each. Flow, as exhibited by cobbles, provides means for analysis but must be used with some discretion.

The principles actuating forward slip were explained, together with the variable influence of rolling pressures as respectively applied to the surface and interior of the bar mass.

Flow in Shape Rolling

Rolling schemes differ widely with equally successful results obtained with each. The study of plain sections is comparatively easy when compared with shape rolling, the latter involving a multitude of curves, angles, and varying diameters, all simultaneously working upon the bar. These influence respective tendencies of flow in the member parts of the shape, the summation of all controlling the action of the bar as a whole.

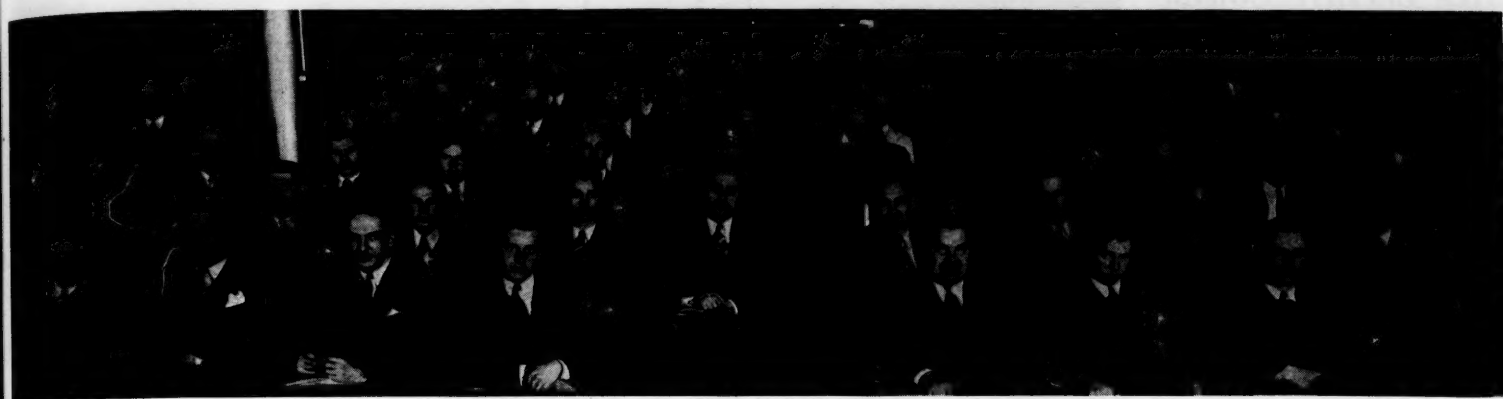
A fascinating sleight of hand expert, J. E. Stewart, brought the meeting to a close.

During the 1937-38 season, Baltimore Chapter experienced a sizable increase in membership, and a record of three outstandingly successful educational meetings which are to be extended in scope next year.

his trip through Florida. These pictures show excellently the beautiful scenes in the state—palm trees, fruit groves, and horticultural gardens, not to mention the Bathing Beauties at Coral Gables.

Thus, Columbus Chapter closed its 1937-38 season with an increase of 50% in membership (94 to 144).

New Jersey's Unique Educational Course Utilizes Movies



Visual Education Was Enthusiastically Received by Groups Such as This Photographed at the Last Meeting in the Series of Four.

Four Films Present Story of Welding, Alloy Steel, Steel Manufacture, Stainless

By F. A. Pease

New Jersey Chapter—An innovation in Society educational activity was the recent series of "lectures" given by the New Jersey Chapter as its spring educational course. The Chapter this year offered its members a series of motion pictures on metallurgical subjects as a change from the customary oral lectures.

The interest shown far surpassed the fondest hopes of the proponents of the idea within the Chapter and should be good study material for the National Society which has recently appointed a committee to investigate the possibilities in visual education.

Questionnaire Shows Preferences

John F. Wyzalek, chairman of the Educational Committee, based his final selection of pictures to be shown and, in fact, approval of the idea itself, on the results of a questionnaire submitted to the membership before the course was presented.

The series comprised four pictures given on successive Wednesdays in late March and early April.

The first film, a sound picture on "Welding, the Redesign of Simple and Complicated Parts to Fabricated Steel," was given by the Taylor-Winfield Corp. It showed the production of fabricated steel parts in successive steps, such as design, template making, flame cutting, shearing, grinding, annealing, shot blasting, machining, and painting. A separate film showed resistance welding machines in operation in automotive and farm implement plants.

The second picture was entitled "The Making of Alloy Steel" by the Bethlehem Steel Co. It portrayed the various steps in the manufacture of alloy steel, beginning with the preparation and charging of the open-hearth furnace.

Chicago Invites Entries in Annual Golf Tournament

By David R. Howerton

The annual golf outing of the Chicago Chapter is to be held Saturday, August 27, 1938. Because of its excellent facilities, Glen Eagles Country Club has been chosen for the scene of the skirmish.

All-day golf, including an 18-hole handicap tournament, a delicious steak dinner and a host of prizes will be features of the day.

It is planned that several chapter teams should compete for a team trophy. Any chapter desiring to enter a team for match play competition should mail its entries immediately to W. O. Owen, district manager, Surface Combustion Corp., 122 S. Michigan Ave., Chicago, Ill.

nance and ending with the delivery of alloy steel bars on railroad cars.

"The Story of Steel" by U. S. Steel Corp., the third movie in the series, showed the manufacture of rail, plates, wire products, seamless tubing, sheet steel and tin plate.

The final film was "Enduro-Stainless Steel" by Republic Steel Corp., showing the manufacture of stainless steel from the mining of ore in far-off Rhodesia to the mirror finished sheet. It portrayed the extreme care and high expense involved in producing this metal.

The ease with which stainless steel lends itself to deep drawing, forming, welding, soldering and many other fabricating processes was shown, and its applications from wrist watches to battleships depicted.

Despite the bad weather that prevailed for three of the four meetings, the total attendance was 883. The significance of this turn-out can be appreciated in the light of an average Chapter membership of about 500.

This acceptance by the New Jersey Chapter members and their friends of the visual educational course substantiates the wisdom of including this type of educational activity as one of the methods to be investigated by the new National Education Committee.

W.E. Benninghoff and Frank Pedrotty Are On Double Feature

By Ray P. Dunn

North West Chapter—A first class, double-feature program on April 12 presented two noted speakers, W. E. Benninghoff of the Ohio Crankshaft Co. and Frank W. Pedrotty of the American Foundry Equipment Co.

Mr. Benninghoff first gave a concise summary of the fundamental principles of magnetism and induction in order that the Tocco process might be fully understood. This preparatory information was followed by numerous slides illustrating the precise control of surface hardening obtained by this method.

Higher speeds, higher pressures and harder bearings brought about the development of the Tocco process for producing harder automobile crankshaft journals.

Movie on Wheelabrator

The newer developments comprise simplicity of operation after initial adjustment, speed of operation, uniformly hard surfaces, and the shaping of electrode faces to conform to the depth of case required in various parts of the object being heat treated.

"Wheelabrator Equipment" was the subject of Mr. Pedrotty's talk and the title of the accompanying movie show-

ing the construction, principles and numerous installations of this new machine for cleaning castings.

The Wheelabrator principle employs an eight-bladed wheel similar to a stern wheel revolving on a horizontal axis; lead shot is fed into the center of the wheel revolving at about 2250 r.p.m. and is ejected from the blades by centrifugal force down upon the object 14 in. below.

By this method castings are easily handled and rapidly cleaned with better surface characteristics than can be obtained by sandblasting.

The meeting was thrown open for questions after each of the excellent talks.

British Institutes Will Meet in New York, Visit Metal Congress

The regular autumn meetings of the British Iron and Steel Institute and the British Institute of Metals will be held next October in New York City, at the joint invitation of the American Iron and Steel Institute and the American Institute of Mining and Metallurgical Engineers. The technical sessions will be held on Oct. 3 and 4.

The visitors will make their visit the occasion of extended inspection tours to metallurgical plants and laboratories in both Canada and the United States. The Canadian trip will precede the New York meeting and will include Quebec, Montreal, Ottawa, Sudbury, Toronto, Hamilton, Niagara Falls, and Buffalo.

Following the sojourn in New York, the visiting metallurgists will divide into two groups on the basis of their primary interest in either ferrous or non-ferrous metals, and each group will begin an inspection tour which will cover a large portion of the North-eastern metallurgical regions of the United States.

Both tour groups will be together at Detroit for the first few days of National Metal Week beginning Oct. 17. In addition to inspection trips in Detroit, the British Institutes will attend sessions of the A.I.M.E. metals divisions and of the American Society for Metals and also will visit the National Metal Exposition.

The British Institute of Metals has arranged to present its usual Autumn Lecture on Monday evening, Oct. 17, as a portion of the program of National Metal Week. The subject of the lecture will be "Gases in Metals" and the speaker will be C. J. Smithells of the research laboratories of the General Electric Co., Ltd. of Wembley, England.

Other cities visited on the tour will include Baltimore, Washington, Pittsburgh, Youngstown, Cleveland, and Chicago.

Christie's Talk on Wrought Brasses Is Fitting Conclusion to Trip Through Brass Mill

By R. J. Haigis

Hartford Chapter—Through the courtesy and cooperation of the Bristol Brass Corp., members were given the opportunity to see an up-to-date brass mill in full operation on May 10.

A goodly number took advantage of this opportunity and they were well repaid, for the Bristol Brass Corp. handled the crowd very efficiently, supplying a number of competent guides to take the visitors through in small groups and explain and illustrate all the operations in the manufacture of brass from the melting down in induction furnaces through the stages of cold rolling and annealing of strip and sheet, and hot extrusion of rods and bars, up to the finished product.

Discussion Precedes Banquet

The plant visitation was concluded at 4:00 P. M. but this did not, by any means, conclude the activities of the day. At 4:30 the meeting was continued in the New Departure Club with an interesting talk on "The Compositions of Common Wrought Brasses" by John L. Christie, chief metallurgist of the Bridgeport Brass Co. (since June 1 with Handy & Harman). Technical

chairman was Horace W. Staples, metallurgist of the Bristol Brass Corp.

Mr. Christie's talk was excellently delivered and, of course, very timely. It was appropriate that the evening should be spent in learning of the compositions, properties, uses and peculiarities of the various wrought brasses.

After an interesting discussion all adjourned to the banquet hall to regain some of the energy which had been expended during the afternoon and early evening in acquiring knowledge on the subject of brass.

To make certain that none could complain about lack of thoroughness in the program, two past national presidents of the A.S.M., namely Frederick G. Hughes and A. H. d'Arcambal, were present and gave short talks.

All in all, it was an extremely satisfactory program of events. The Hartford Chapter is particularly grateful to the Bristol Brass Corp. for opening its plant to A.S.M. members, and wishes to take this opportunity to thank Mr. Horace W. Staples, metallurgist of that company, for his efforts in making this program possible and for the efficient manner in which the plant visitation was conducted.

Five Experts Will Give Lecture Course At Metal Congress

(Continued from page 1)

erties and uses of Steel" published some years ago by the A.S.M. He is metallurgist for International Harvester Co. in Chicago.

The third lecture will be on machining cast steel, cast iron and wrought iron. Its author is John Ward Bolton, chief chemist and metallurgist, Lunkenheimer Co., Cincinnati, who is the author of a recent book on "Gray Cast Iron" as well as a multitude of technical papers on cast iron.

Past A.S.M. President A. H. d'Arcambal will discuss the machining of tool steels. He has been intimately connected with the tool steel and small tool industry for many years, having been with Pratt & Whitney Co. since 1919, now in the capacity of consulting metallurgist and sales engineer of the small tool division. He will be assisted by W. E. Bancroft, chief metallurgist for Pratt & Whitney.

The machining of non-ferrous metals, cast and wrought, will be covered in the final lecture by H. P. Croft, metallurgist for Chase Brass & Copper Co. in Cleveland. While making a name for himself in the brass industry, Mr. Croft has also found time to serve the Cleveland Chapter of the Society, acting as chairman in 1936-37.

A shorter lecture course on the subject of "Pyrometry" will be conducted on three successive evenings during the Congress by Robert B. Sosman, physical chemist, U. S. Steel Corp. Research Laboratories, Kearny, N. J.

Dr. Sosman was a physicist in the geophysical laboratory of Carnegie Institution of Washington for 20 years before joining U. S. Steel in 1938. He holds various degrees in chemistry, electrochemistry and ceramics, with a Ph.D. in physical chemistry from M.I.T. and a D.Sc. degree from Ohio State University.

A. L. Boegehold, chief metallurgist,

Congress Lecturers



Robert B. Sosman (Upper Left) Will Present a Three-Lecture Educational Course on "Pyrometry" at the National Metal Congress in Detroit Next Fall, and A. L. Boegehold (Upper Right) Will Present the Annual Campbell Memorial Lecture. In the center row are A. H. d'Arcambal (left) and Hans Ernst (right), who will present two of the lectures in the course on "Machinability," and in the bottom row, left to right, are J. W. Bolton, H. B. Knowlton and H. P. Croft, who will conduct the other three lectures in the series of five.

General Motors Research Laboratories, Detroit, has been selected to deliver the Campbell Memorial Lecture, presented during the Annual Meeting of the American Society for Metals on Wednesday morning, Oct. 19. His subject has not yet been announced.

100-Ton Flying Ships to Carry 50 Staterooms

Sikorsky Sketches Future for Aircraft With Regard to Speed, Altitude and Size

By J. Z. Briggs

New York Chapter—The remote possibility of obtaining a wrong number was among the phases of telephone communication discussed by E. H. Goldsmith of the New York Telephone Company in a coffee talk at the April 11 meeting.

Carl de Ganahl, president of Fleetwings, Inc., introduced the main speaker, I. I. Sikorsky, engineering manager of Sikorsky Aircraft.

Twenty-five years ago in Russia, Mr. Sikorsky built the first four-engined airplane, which weighed 4½ tons and amazed many skeptics by actually flying at a speed of about 60 miles per hour. Photographs showed that this pioneer ship had an intriguing open-air promenade on the fuselage.

Now the Sikorsky Aircraft Corporation is building the "Clipper Ships," which have made history by establishing regular service across the Pacific. Preliminary plans have been sketched for 50 and 100-ton flying ships. The latter would have over 50 staterooms and a large restaurant which, besides being used for serving meals, would be used for dancing and games.

Today's Records Predict Future

To know what the future holds, it is helpful to study first the world records of today. The greatest speed ever reached by man is 440.6 miles per hour. Although formerly it was thought that the speed could substantially be increased, modern research has disproved this statement.

It has been reliably demonstrated that the smooth flow of air over the streamlined wings is interrupted when the speed reaches or approaches the velocity of sound (about 760 miles per hour). Adverse effects on the flow of air and considerable increase in parasite resistance become very pronounced even below that speed and, therefore, 500 miles per hour is about the maximum speed that can be expected of an airplane.

The highest operating speed of air transports is now between 200 and 250 miles per hour. A further increase of possibly 100 miles per hour, bringing the operating speed to a figure in excess of 300 miles per hour, may be expected in some cases within ten years.

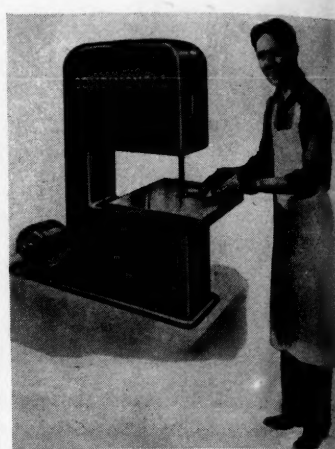
Higher Altitudes Expected

The present world altitude record is 72,395 ft. It was established by Major A. W. Stevens and Captain O. A. Anderson in a stratosphere balloon. The greatest altitude reached by an airplane is 51,361 ft. All transport flying is done at a considerably lesser altitude and only in exceptional cases does passenger-carrying aircraft exceed 15,000 ft. altitude.

In the near future it may be expected that a somewhat higher altitude will be used on several important passenger-carrying air lines. These altitudes which are sometimes referred to as the sub-stratosphere and which are between 20,000 and 30,000 ft., have most of the advantages of higher flying such as lack of storms, thunder clouds and ice formation, and yet do

WANTED!
Small, used, beam-type tensile testing machine.
Address Box 6-1
American Society for Metals
7016 Euclid Ave. Cleveland, Ohio

New Filing Machine



A new, low-priced band filer has just been completed by Continental Machine Specialties, Minneapolis.

The file band is a Swedish flexible spring steel band on which are riveted short segments of special files. When the band flexes over the upper or lower wheel pulley, the file segments open. They close and interlock securely, however, as soon as they leave the upper wheel, and form a continuous flow of rigid filing surface at the point of work. There is a narrow support behind the files at this point, so that great pressure can be exerted for rapid filing.

Cost of these specially constructed file bands is low, since they last two or three times as long as conventional files. For instance, the band cuts in one direction only, thus eliminating the back stroke of hand filing, which dulls the file teeth.

The band files also exert a steady pressure so that all the surface is used up evenly.

The band filer is operated at just the correct speed for each job and an unskilled Continental operator can equal the results of the most expert hand filer.

Great pressure can be exerted so that heavy cutting on a wide area can be done, and the machine will file an absolutely straight and smooth surface up to 5½ in. thick.

Appointed by Basic Dolomite

W. T. Schaup, who has been appointed as service engineer by Basic Dolomite Inc. of Cleveland, has a long record of service in the iron and steel industry as well as a number of years' experience in selling refractories.

Beginning his steel career in 1881 as a messenger boy, Mr. Schaup has had many years experience in the melting and open-hearth departments of various steel companies. In 1927 he went with Canadian Refractories Co. of Montreal, and is now serving plants with products of this company as well as other products of Basic Dolomite, Inc.

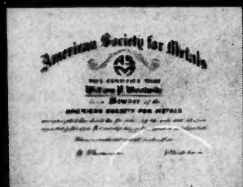
Mr. Schaup has offices at 1714 Keystone Hotel Bldg., Pittsburgh.

not include the difficulties and the great increase in cost that would be connected with very high altitude flying.

It is probable, therefore, that in the future part of the passenger traffic will be done in the sub-stratosphere, while at a more remote period a certain part of it may even go to 50,000 ft.

With reference to the size of aircraft the limitations do not appear to be in sight. Large flying Clippers carrying hundreds of passengers and having a gross weight of 100 tons or more can soon be expected.

Still larger aircraft is possible, but it is believed that traffic requirements and economical factors will limit their size before the engineering limitations will be reached.



A Symbol of Your Membership

One way to perpetuate the part you are playing in the development of your industry and your Society is by obtaining the handsome steel-engraved membership certificate illustrated above.

Certificates are available in two sizes in either a black and gilt or stainless steel frame. Just fill in the coupon, enclose check or money order, and mail.

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American Society for Metals
7016 Euclid Avenue Cleveland, Ohio

Name.....
(Please letter carefully for inscription on certificate)

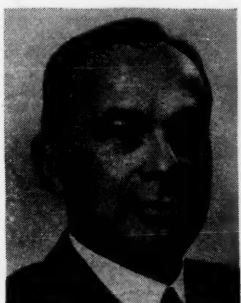
Address.....

City.....State.....

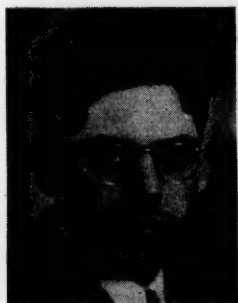
HERE AND THERE WITH A.S.M. MEMBERS

RUFUS E. ZIMMERMAN, who rose from the position of research associate for American Sheet and Tin Plate Co. in 1914 to that of director, member of the Executive Committee, and vice-president in charge of research and technology of United States Steel Corp. of Delaware on Jan. 1, 1938, has now been honored by the award of the degree of Doctor of Science from Franklin and Marshall College, Lancaster, Pa.

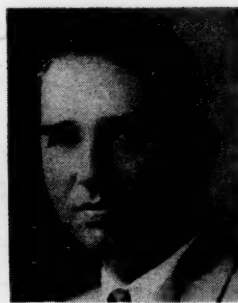
Mr. Zimmerman was graduated from Franklin and Marshall in 1908 with a Ph.B. degree. He later attended Massachusetts Institute of Technology, receiving his S.B. degree in 1911; for the following three years he was a member of the instructing staff.



R. E. Zimmerman



R. H. Heyer



W. P. Sykes

Also awarded an honorary degree of Doctor of Science by Franklin and Marshall College was **ROBERT F. MEHL**, head of the department of metallurgy and director of the Metals Research Laboratory, Carnegie Institute of Technology.

"Dr. Mehl has made extensive contributions of great practical value to the science of physical chemistry," said

Van Horn Outlines Recent Advances in Non-Ferrous Alloys

By M. M. Kennedy

Philadelphia Chapter—On April 29 the members spent an enjoyable evening listening to Kent R. Van Horn talk on "Recent Advances in Non-Ferrous Alloys."

Starting his talk with an apology as to his inability to do justice to the subject, Dr. Van Horn spoke of copper ingot produced practically free of oxygen, and developments in bright annealing. He then continued with the elements added to copper to increase the tensile strength and other properties, emphasizing the silicon bronzes and the heat treatable beryllium coppers.

Leaving copper, the speaker passed into a discussion of electro-galvanizing and then the zinc base die-casting alloys, describing the older compositions and discussing their weaknesses, and comparing them with the new alloys.

Aluminum and aluminum alloys were then taken up, and the effect of many alloying elements and present-day commercial applications of aluminum alloys were discussed. The free-cutting copper-lead-aluminum alloy that is now produced should not be possible, according to some previous rarely used metallurgical data.

Dr. Van Horn warned the members

the citation accompanying presentation of the degree. "By his many successful investigations into the physical and chemical properties and behavior of metals and alloys, and especially by his invention and development of gamma ray radiography, he has rendered extraordinary service to American industrial enterprise and American naval engineering."

NEW kudos to **WESLEY P. SYKES**, metallurgical engineer at Cleveland Wire Works of General Electric Co., authority on tungsten, molybdenum and their alloys, takes the form of an honorary degree of Doctor of Engineering at Case School of Applied Science.

Immediately after graduation from Case in 1916 "Bill" enlisted in the Navy. After the War he joined G.E. and has been there ever since, developing new alloys containing tungsten and molybdenum and investigating the properties and fabrication of alloy wires.

Best indication of the value of his writings, which won him the Howe Medal of the A.S.M. in 1926 and the honor of delivering the Campbell Memorial Lecture in 1937, is perhaps the fact that they have been translated into no less than 17 languages!

ROBERT H. HEYER, metallurgist in the research laboratories of the American Rolling Mill Co., has been notified he will receive the Charles B. Dudley Medal of the American Society

against having too much faith in constitutional diagrams based on research carried on previous to the use of modern research equipment, and using metals which were far from pure in comparison with today's standards. He claimed that the constitutional relations determined by numerous independent workers employing many different methods of investigation have definitely established some correct diagrams.

The lecture was concluded by a dis-

for Testing Materials for his paper on "Analysis of the Brinell Hardness Test," presented at the Society's 1937 meeting.

The medal, one of the highest honors in metallurgy, will be presented to Mr. Heyer at the 1938 meeting of the Society, June 27 to July 1 at Atlantic City.

Mr. Heyer came to Armco from Purdue University, where he was an instructor in metallurgy.

The Dudley Medal, commemorating the name of the first president of the Society, was first presented in 1925 as an annual award to the author of a paper presented before the Society which is of outstanding merit and constitutes an original contribution on research in engineering materials.

EDGAR BROOKER, Stanford '27, for six years in the research and development department of Standard Oil Co. of Calif., presently the only metallurgist in the Atchison, Topeka & Santa Fe Railroad, stopped off at headquarters in Cleveland on his way to Washington, D.C., where he has accepted a position in the construction and repair department of the Navy.

ENGINEERING MATERIALS AND PROCESSES is the title of a new book written by two prominent members of the Los Angeles Chapter, **WILLIAM HOWARD CLAPP**, professor of metallurgy and machine design, California Institute of Technology, Pasadena, and

discussion of the recent developments in magnesium and lead.

The applause accorded Dr. Van Horn when he completed his talk and the congratulations offered by several very conservative members showed how well he had done the job.

The coffee talk at the dinner preceding the meeting was given by Past Chairman George W. Keller, who spoke on salesmanship and merchandizing, with which Mr. Keller is very familiar.

DONALD SHERMAN CLARK, instructor in mechanical engineering at Caltech and past chairman of the Los Angeles Chapter and national trustee-elect.

R. C. LEWIS, sales engineer, Farrell-Birmingham Co., Ansonia, Conn., was killed in the crash of an air liner near Cleveland on May 24.

HENRY A. DEFRIES, 55, special representative and sales engineer in Cleveland for Ludlum Steel Co., died May 23. Mr. deFries was well known as an expert in the manufacture, processing, handling and fabrication of the corrosion and heat resisting steels generally classified as stainless steel.

In addition to being a talented, energetic and efficient engineer in matters metallurgical he is mourned by a host of friends from coast to coast not only within the Ludlum organization but among his customer clientele throughout the trade, and his fellow members of the American Society for Metals.

Two-Day Penn State Meeting Features 4 Technical Papers

Events in the Third Biennial Pennsylvania Inter-Chapter Meeting of the Society held at State College, Pa., May 20 and 21 began with a technical session on Friday afternoon.

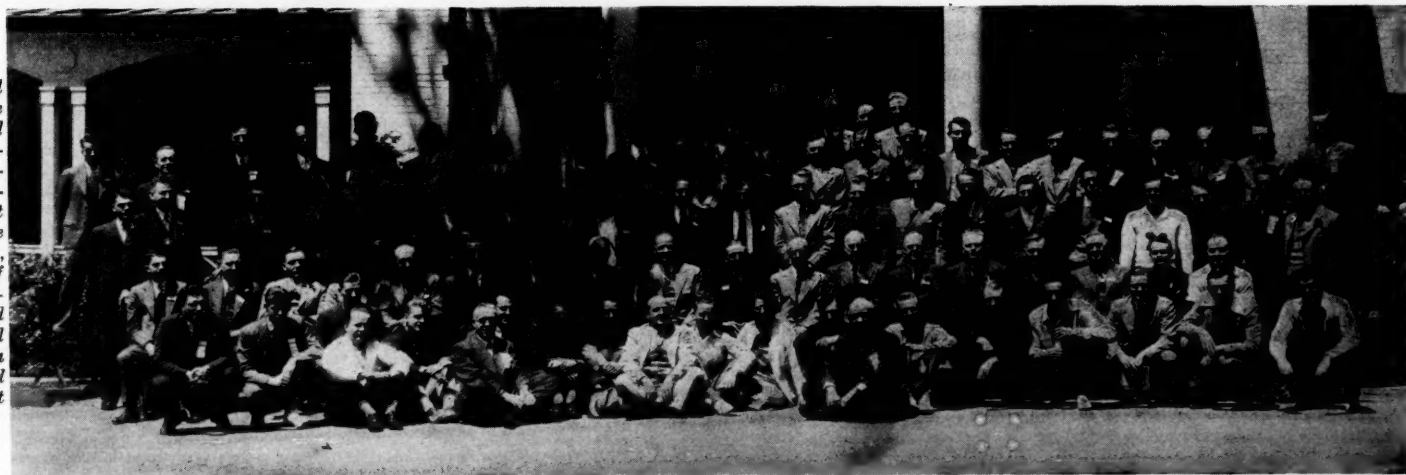
Nearly 150 members of the Society representing the Lehigh Valley, Southern Tier, Philadelphia, Pittsburgh, York and Penn State Chapters were welcomed by Dean Edward Steidle of Penn State's School of Mineral Industries and Prof. D. F. McFarland, head of the department of metallurgy and secretary of the Penn State Chapter.

Two talks were scheduled on the first session—namely, "Large Forgings, Their Manufacture and Properties" by Adolph O. Schaefer, and "Research, What, Why, How" by L. C. Conradi. A second session held Saturday morning featured lectures by A. Floyd Whalen on "History, Manufacture and Testing of High Pressure Gas Cylinders" and by Joseph C. Eckel on "Cold-Rolled Sheets and Their Applications."

An informal dinner at the Nittany Lion Inn on Friday was followed by a smoker featuring the "Great A.S.M. Amateur Hour Led by Major Blows."

Ladies who accompanied members to the meeting were entertained by an informal tea and the dinner on Friday and a sightseeing tour on Saturday.

150 Members From Six Chapters Assembled at Penn State



Photographed at the Close of the Third Biennial Pennsylvania Inter-Chapter Meeting, Held at State College May 20 and 21. This Group of A.S.M. Members Attended Two Technical Sessions, a Banquet and Entertainment

Free Literature — Mail Coupon Below

Firebrick

Babcock & Wilcox make an insulating firebrick which is refractory as well as insulating and can be used without a facing of firebrick. Description, applications, and engineering data are contained in Bulletin Fy-75.

Defi Rust

Analysis and descriptive notes of nine types of heat and corrosion resisting steels made by Rustless Iron and Steel Co. are contained in a handsome folder. Bulletin Ha-169.

Hard Facing

Step by step instructions for hard facing steel with Haynes Stellite are given in an article published in pamphlet form by The Linde Air Products Co. Bulletin La-63.

Malleableizing

A folder by Surface Combustion Corp. on the use of the radiant tube heating element for malleableizing cast iron contains a reprint of an Iron Age article by Carl F. Joseph. Diagrammatic view and description of the element are included. Bulletin Fa-51.

Park-Kase

A leaflet by Park Chemical Co. contains complete information concerning a new liquid carburizer of rapid and uniform penetration. Unique features and advantages of the bath are backed up with technical data. Bulletin Na-141.

Carbonate Remover

A material for use in removal of carbonate from plating solutions is described in a new Electroplating Service Bulletin issued by the Electroplating Division of E. I. du Pont de Nemours & Co. Bulletin Bb-95.

Carburizer

Modern is the furnace and modern is the catalog which describes it. Hevi Duty Electric Co. has an exceptionally well-written, well-illustrated, and artistically printed booklet on the Hevi Duty carburizer which uses the Carbonol process. Bulletin La-44.

Heat Resistance

Those who have sent for the other bulletins in Republic Steel Corp.'s series on "Republic's Perfected Stainless Steels" will not want to miss the one describing the heat resisting types, HCN, NC-3, and HC. Bulletin Ba-8.

Metallographic Catalog

Constant refinement and improvement necessitates frequent revision of Bausch & Lomb Optical Co.'s catalog of metallographic equipment and accessories. The latest issue has 32 pages, both detailed and tabular descriptions, and ample illustration. Bulletin Cb-35.

Copper Bulletin

A new clearing house for news of developments in brass, bronze and copper, the "Copper Alloy Bulletin," issued by the Bridgeport Brass Co. made its appearance with the March issue. It is edited for the technical and engineering audience. Bulletin Da-163.

N and Mo in Stainless

A valuable addition to any metallurgist's library is a set of tables giving physical properties of high-nitrogen chromium and chromium-nickel steels and columbium-bearing chromium-nickel steels. Electro Metallurgical Co. Bulletin Da-16.

Fleetweld

"Fleetweld" is only one of the 21 electrodes made by Lincoln Electric Co. for various welding and hard facing needs that are described in a new bulletin. Procedures and weld properties are given. Bulletin Cb-10.

Wire Belts

An 8-page folder on Monel metal woven wire conveyor belts lists the advantages of Monel metal, illustrates some typical installations, and describes the various belt constructions that are available. Cambridge Wire Cloth Co. Bulletin Bb-178.

Arcos Electrodes

An unusual technical bulletin describing the arc welding of stainless steel industrial equipment has just been published by the Arcos Corporation, Philadelphia. Bulletin Db-191.

Cleaning News

A newsy little magazine of the pocket-size type, issued by Oakite Products, Inc., contains interesting news of developments in the cleaning and electroplating of zinc alloy die castings and other articles of general interest to anyone in the metal field. Bulletin R-178.

The Review

7016 Euclid Ave., Cleveland

Please have sent to me without charge or obligation the following literature. Circle the numbers that interest you. It is important to write in your company or business connection when you return this coupon. (Please print.)

Name Title
Company
Company Address
City State

Col. 1	Col. 2	Col. 3	Col. 4
Fy-75 Ba-8	Db-190 Fb-60	Eb-64 Ia-24	D-17 Jy-12
Ha-169 Cb-35	Fb-88 Fb-45	Eb-68 Oy-71	Da-70 Ka-13
La-63 Da-163	Ca-160 Fb-54	Eb-106 Db-171	Cb-66 La-93
Fa-51 Da-16	Fb-46 Fb-197	Eb-118 Db-18	Bb-124 Jy-125
Na-141 Cb-10	Fx-32 Eb-19	Eb-28 Bb-11	Bb-84 Db-192
Bb-95 Bb-178	Fb-148 Jy-127	Ca-110 Ia-168	Ka-49 Ny-46
Da-44 Bb-178	Fb-76 R-179	De-4 Fx-57	S-83 Fb-182
		Ay-30 Db-184	Eb-56 Fb-22
		Ax-47 Gb-192	Eb-147 Jyb-122

Metal Hydrides

Reprints of articles by Dr. P. P. Alexander on "The Hydride Process" discuss history, production and the uses of metal hydrides. Metal Hydrides, Inc., Clifton, Mass. Bulletin Db-190.

Porous Mediums

Norton Porous Mediums for commercial and laboratory processes are outlined in the pages of a 16-page booklet just issued by the Norton Company. Charts show flow of air, pressure loss, and other physical characteristics. Bulletin Fb-88.

Metals for Corrosion

Fourteen varieties of Midvaloy corrosion and heat resisting metals are described in a detailed bulletin by The Midvale Co. Properties and applications are listed and illustrated. Bulletin Ca-160.

Homo Furnaces

The complete line of modern Homo furnaces is shown for the first time in a new, profusely-illustrated 36-page catalog just issued by Leeds & Northrup Company. Shows many varieties of work now being tempered, annealed or normalized in modern Homo furnaces. Bulletin Fb-46.

Ni-Cr Castings

Compositions, properties, and uses of the high nickel-chromium castings made by The Electro Alloys Co. for heat, corrosion and abrasion resistance are concisely stated in a handy illustrated booklet. Bulletin Fx-32.

Wetting Agents

The American Cyanamid & Chemical Corp. has just issued a 32-page booklet which describes the Aerosol Wetting Agents, new synthetic chemicals possessing remarkable wetting, penetrating, emulsifying and dispersing properties. Bulletin Fb-148.

Pipe

A fatigue-resisting pipe for railroads—Ammonoduct—is presented in a 4-page folder issued by the Bethlehem Steel Company. Gives interesting facts about the use and properties of the new pipe and illustrates peculiar features. Bulletin Fb-76.

Measuring

A striking 32-page booklet, well-illustrated and beautifully laid out, has just been issued by the General Electric Company. Pictures and describes the many GE measuring instruments. Bulletin Fb-60.

Marine Rivets

High strength corrosion-resisting rivets for marine construction are fully described in a new 8-page folder released by the International Nickel Company. Points out features of the low carbon 1½% nickel steel rivets. Bulletin Fb-45.

Activated Alumina

The properties and uses of Activated Alumina are presented in an attractive 42-page spiral-bound booklet just issued by the Aluminum Company of America. Well stocked with illustrations, charts and tables, this booklet should make a valuable addition to your reference shelf. Bulletin Fb-54.

Hardness Testers

A handy thing to have around for anyone who does much hardness testing is a complete and detailed catalog of the universal line of hardness testers carried by Pyro-Electro Instrument Co., together with information on various specialized pieces of auxiliary equipment. Bulletin Fb-197.

Enameling Racks

The "A, B, C's" of selecting enameling racks are set forth in interesting manner in a clever little 8-page booklet published by the Driver-Harris Co. Bulletin Eb-19.

Electroplating

A complete group of chemicals, processes and materials of interest to those engaged in electroplating is listed in this 8-page booklet published by the E. I. du Pont de Nemours & Co., Inc. Bulletin Eb-29.

Newer Tool Steels

Vulcan Crucible Steel Co. has a complete and attractive catalog listing their full line of tool steels including many special types to meet the modern trends in industry. Bulletin Jy-127.

Foundry Melting

All the information anyone would need for economical foundry melting is contained in a comprehensive, 52-page book by Whiting Corp. It describes the operation and completely catalogs the cupola, the rotary (Brackelsberg) furnace, the cradle furnace, the air furnace, the side-blow converter, and duplexing equipment. Bulletin R-179.

Continuous Rail

Elimination of joints in railroad tracks by the use of welding cuts down track maintenance according to a 36-page booklet just issued by the Metal & Thermit Corporation. Continuously welded rail a mile or more in length is described and installations of welded track in many parts of the country are pictured. Attractively presented, this booklet gives a valuable insight on metal progress in the transportation industry. Bulletin Eb-64.

Dust Hog

"Why Should You Provide for this fellow and pay for a Dust Hog's Bill of Fare?" is the pertinent question asked in a clever folder just released by the Panborn Corporation. Points out the large losses due to dust in industry and suggests a cure. Bulletin Eb-68.

Steel Buyer's Guide

A handy pocket-size book which gives complete listings and descriptions of the wide range of Certified Steels and allied products carried in stock by Joseph T. Ryerson & Son, Inc. Included in this Stock List are handy reference tables, weight charts, standard specification listings, etc. Bulletin Eb-106.

Cutting Oils

D. A. Stuart Oil Co. offers a new 48-page copyrighted booklet entitled "The Story of Sulphurized Cutting Oils." This new booklet features the scientific application of cutting fluids on metals of different analyses and is well illustrated throughout, an original type of cutting oil application chart proving of particular interest. Bulletin Eb-118.

Photometer

Carl Zeiss, Inc., is offering a new booklet which describes the Zeiss Pulfrich Photometer. Absolute colorimetry, without comparison solution, in metal analysis is very accurate by this instrument. Bulletin Eb-28 will be sent on request.

Radio Principle

How a tried and accepted principle of radio engineering is successfully applied to industrial control instrumentation is described in a folder on a new low-price automatic controller by Wheelco Instrument Co. Bulletin Ca-110.

Molybdenum

Climax Molybdenum Co. presents their annual book giving new developments in molybdenum, particularly as an alloy with iron and steel. The engineering data presented are made clear by many tables and illustrations. Bulletin De-4.

Conveyor Furnaces

Continuous chain belt conveyor furnaces handle miscellaneous parts without pans or trays—they are efficient, uniform, and flexible in operation. Improved furnaces of this type are described by Electric Furnace Co. Bulletin Ay-30.

Ultropak

Two booklets are issued by E. Leitz, Inc., one containing description and catalog of their Ultropak microscope equipment and the other a series of quotations and illustrations from scientists using the method. Get both by asking for Bulletin Ax-47.

Chromel

A new catalog has been issued by Hoskins Mfg. Co. covering Hoskins electric furnaces and Chromel elements, which provide uniform heat and automatic temperature control with excellent production and quality of work. Bulletin Ia-24.

Rolling Mill Bearings

Timken Roller Bearing Co.'s 64-page, 8½ by 11 in. booklet entitled "The Answer to Rolling Mill Bearing Problems" will appeal strongly to mill designers and operators. It is well printed and liberally illustrated with photographs and diagrams. Bulletin Oy-71.

Welding Electrodes

Smootharc Electrodes for every type of work are described in this booklet by the Harnischfeger Corporation. Points out advantages and particular applications of different electrodes. Bulletin Db-171.

Lectromelt Furnaces

The story behind lectromelt furnaces is well told in this 48-page booklet issued by the Pittsburgh Lectromelt Furnace Corporation. Tells of development of this type furnace and describes recent improvements. Bulletin Db-18.

Furnace Headquarters

American Gas Furnace Co., headquarters for 59 years of heat treating furnaces and machines, for efficiency, economy, and production, has issued a general catalog describing various types of equipment and their operation. Bulletin Bb-11.

Tempering

Vertical batch type tempering furnaces are described in a folder by Industrial Heating Equipment Co. Capacity and production figures and a diagram of the furnace are included along with a complete description. Bulletin Ia-168.

Recuperators

Results obtained with Carborundum Company's recuperators using Carbofrax tubes are fuel savings, closer temperature control, faster heating, and improved furnace atmosphere. Complete engineering data are given in Bulletin Fx-57.

Hardener's Pal

J. Milton Luers, Detroit, Mich., has just perfected the "Ste-Tre-Met's," an oil temperer for steel treatment. It's an invaluable aid to the steel treater and will save thousands of dollars in eliminating burnt or soft steel. Write for attractive folder giving full details. Bulletin Db-194.

Laboratory Appliances

Eighty-seven pages are required to catalog a supplementary list of modern laboratory appliances manufactured by Fisher Scientific Co., Pittsburgh. This valuable, illustrated catalog of equipment is available free to laboratories. Bulletin Gb-182.

Heat Resisting Alloys

Authoritative information on alloy castings, especially the chromium-nickel and straight chromium alloys manufactured by General Alloys Co. to resist corrosion and high temperatures, is contained in Bulletin D-17.

Turbo-Compressors

Spencer Turbine Co. has turbo-compressors in all sizes and types for oil and gas-fired furnaces, ovens and foundry cupolas. Special types for special purposes such as gas-tight and corrosion resisting applications are also described in Bulletin Da-70.

Tubulaire

A new method of electric heating which combines circulation, greater radiating surface, and great strength is embodied in tubular resistance elements. Description, specifications and illustrations for the type made by Lindberg Engineering Co. are contained in Bulletin Cb-66.

Heroult Furnace

Revised and expanded to include modern innovations in the construction and operation of the Heroult electric furnace, a new edition of the American Bridge Co.'s Heroult Electric Furnace Bulletin is now ready for distribution. Bulletin Bb-124.

Pipe and Tubes

Handbook and price list containing practical and technical information on Misco "Centric" pipe and tubing (stainless, corrosion and heat resisting) is available from Michigan Steel Casting Co. Bulletin Bb-84.

Heat Treat Chart

Heat treaters everywhere should find a heat treating wall chart complete with S.A.E. specifications a very valuable addition to their shops. Published by Chicago Flexible Shaft Co., manufacturers of Stewart industrial furnaces. Bulletin Ka-49.

Scopes

Shore Instrument & Mfg. Co. describes in Model D standard recording scope in a recent bulletin which explains the theory and practice of hardness testing with this machine. Bulletin S-33.

Rotary Drill Pipe

"The Development of Rotary Drill Pipe," an address by H. W. Graham, general metallurgist for the Jones & Laughlin Steel Corp., has been reprinted by that company and is available in the form of a 22-page booklet. Contains many worthwhile drawings and half-tone illustrations which show analysis, structure and properties of different pipes. Bulletin Eb-50.

Balancing Machine

A new booklet from the Tinius Olsen Testing Machine Company describes their Vibro-Electric-Static-Dynamic Balancing Machines. This type of balancing machine is ideal equipment for balancing, both statically and dynamically in operation, any small high speed rotating member where an accurate balance is a prerequisite. Bulletin Eb-147.

Stainless Slide Chart

Carpenter Steel Co.'s pocket-size slide chart gives at a glance the technical data on all stainless steels. Bulletin Jy-12.

Ingot Production

"The Ingot Phase of Steel Production" is the title of a book defining the principles of quality ingot production followed by many well-known steel manufacturers. Gathmann Engineering Co. Bulletin Ka-13.

Pictorial Story

A pictorial and descriptive story of the manufacture of steel products by The Youngstown Sheet and Tube Co. is in reality a textbook of basic steel information contained in a 115-page, leather-covered, pocket size ring binder. Bulletin La-93.

Stainless Data Book

All users of stainless and heat resisting alloys should find invaluable the information contained in a booklet published by Maurath, Inc., giving complete analyses of the alloys produced by the different manufacturers, along with the proper electrodes for welding each of them. Bulletin Jy-125.

Dolomite Refractories

The case of Clinkered vs. Calcined Dolomite in the basic openhearth steel is set forth interestingly in a new pamphlet by Basic Dolomite, Inc., Cleveland, O. Bulletin Db-192.

Electric Salt Baths

Literature is available from Bellis Heat Treating Co. describing electrically heated heat treating furnaces which are economical to operate and have a wide range of applications in hardening, annealing and heat treatment of high speed steel, stainless steel, nickel, aluminum, copper and bronze, etc. Bulletin Ny-48.

For the Laboratory

Fisher Scientific Co.'s new catalog on Catalytic laboratory appliances is well arranged and informative. It covers the complete line of clamps and frames for all laboratory purposes made of this high strength corrosion resisting material. Bulletin Db-182.

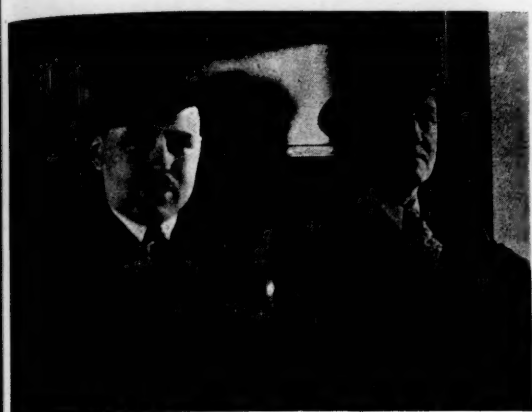
Hardness Testing

A 4-page folder which has as its purpose "to give you an idea of how practical a thing it is to make hardness tests on raw stock or fabricated metal parts in all plants where metal is worked, and to suggest something of the necessity for making such tests, or at least their importance" is available through the Wilson Mechanical Instrument Co., Inc. Bulletin Fb-22.

Steel Handbook

A handbook has been prepared by Heppensall Co. covering the effects of alloying elements and the physical properties of steel in forged sections. Such valuable data as heat treating directions, McQuaid-Ehn grain size classification, hardness conversion tables, and physical property tables are included. Bulletin Jyb-122.

Canadians on Excursion to Buffalo Chapter



S. G. Simmons and W. L. Morrow Snapped on the Train



President Waterhouse Presented His Talk on "Metallurgical Pioneers" at the Dinner Meeting Which Followed an Inspection Trip to the New Continuous Strip Mill of Bethlehem Steel Co. at Lackawanna

Ontario Takes Over City of Buffalo in Joint All-Day Meeting

Key to City Not Needed by Visitors Who Know Way About, Provide Entertainment

By George F. Roeder

Members of the Ontario Chapter of the American Society for Metals spent a very profitable and entertaining day as guests of the Buffalo Chapter on Friday, April 22. The program commenced in the afternoon, with a visit to the new \$20,000,000 continuous strip mill of Bethlehem Steel Co. at Lackawanna.

The party was given the freedom of the plant and took advantage of an opportunity to watch every phase of the process from slab storage building to finished sheet.

The hot rolling mills were in operation and the tour proceeded through that department to the pickling building and the cold rolling plant where the sheet was subjected to cold reduction and to various cutting operations.

Dinner at the Hotel Buffalo brought together over 100 Canadians with a large group from the Buffalo Chapter, and about 300 were present for the meeting.

National Officers Speak

National Secretary Bill Eisenman was the first speaker on the program. His interesting sidelights on national activities and spicy comments added greatly to the success of the meeting.

National President Waterhouse then presented his now-famous talk on "Metallurgical Pioneers."

In addition to the regular meeting, those present were greatly entertained by the unusual array of talent among the members, especially those from the Ontario Chapter. Special mention is due to the artist who easily "out-launched" Harry Lauder. Our special reporter was unable to determine if he was Scotch inside, outside, or all over.

Group singing took the form of anthems to the matron saint of the metal industries—"Sweet Adeline."

The Buffalo hosts had planned to present the Key to the City of Buffalo to the Canadian visitors, but found they all knew their way about and all managed to "take" the town without any keys. Some brought their wives for protection. Others did not fare so well.

The return sleeping cars for the Ontario Chapter were made up several hours in advance, but owing to other important matters, some of the visitors just managed to make the connection by "dead-heat" finishes. By ten o'clock the following morning all was quiet "along the Niagara."

QUIZ QUESTIONS

George L. Kehl won honorable mention for the following set of "Quiz Questions" submitted in a recent competition conducted by THE REVIEW. Try your hand at answering them and see how good your general metallurgical knowledge is by consulting the answers on page 8.

1. It is commonly believed that ghosts originate from the spirits of the dead and are found only in haunted houses and cemeteries, but did you know ghosts are found in rolled steel and have their origin from
 - (a) The "killing" of a steel ingot.
 - (b) Segregated areas that are rich in phosphorus.
 - (c) Too much sulphur in the steel.
 - (d) Too fast a roll speed in rolling.
2. When pure iron is heated from room temperature to 1000° C., there is a marked dilatation at 900° C. This is because
 - (a) The face-centered lattice structure of alpha iron is more dense than the body-centered structure of beta iron.
 - (b) At 900° C. impurities expand, resulting in an expansion of the metal.
 - (c) The body-centered lattice structure of alpha iron is not as dense as the face-centered lattice structure of gamma iron.
 - (d) The problem is of such a complex nature that no one has been able to offer a satisfactory explanation.
3. Be careful of this one. The name of a past president of the A.S.M. is
 - (a) Charles Edgar Bain.
 - (b) Edgar Clem Bain.
 - (c) Edgar Charles Bain.
 - (d) Edgar Collins Bain.
4. We all know that in order to identify MnS inclusions in steel by microscopic examination, we would look for dove-gray colored areas. But did you know that areas of FeS would be colored
 - (a) Baby pink.
 - (b) Blue to purple.
 - (c) Yellow to pale brown.
 - (d) Orange to dark red.
5. Consider a simple solid solution forming alloy, such as copper (melting point 1083° C.) and nickel (melting point 1452° C.). If you were asked how the percentage by weight of copper in the liquid and solid phases varied as the alloy was slowly cooled from the liquidus to the solidus, you would answer
 - (a) The copper percentage increases in the liquid phase, decreases in the solid phase.
 - (b) The copper percentage decreases in both phases.
 - (c) The copper percentage increases in both phases.
 - (d) The copper percentage decreases in the liquid phase, increases in the solid phase.
6. Although some of us do not use the term "osmondite," we've all heard it and should know that it means
 - (a) A name for the condition of steel when made up wholly of troostite.
 - (b) The name applied to the crystalline-appearing fracture resulting from fatigue failure.
 - (c) A severe case of overheating steel prior to quenching.
 - (d) The structural condition of steel after being subjected to tension slightly beyond its yield point.
7. A great many precision instruments and clock pendulums are constructed from "invar," because it is an alloy which has practically no dilatation. This alloy is a
 - (a) Quenched chromium steel.
 - (b) Austenitic nickel steel.
 - (c) Copper steel.
 - (d) Eutectic alloy of SnCu₂ and Cu₃P.
8. The A.S.M. convention to be held in Detroit, October 17 to 21, 1938, is what annual convention of the Society?
 - (a) Thirteenth.
 - (b) Twentieth.
 - (c) Twenty-first.
 - (d) Eighteenth.
9. Besides being one of the foremost metallographists of all times, did you know that Sorby was also an adept
 - (a) Archer
 - (b) Locksmith
 - (c) Sailor
 - (d) Cabinet maker.
10. If you were asked to produce a grey cast iron of 4.3% C with as much carbon as possible in the graphitic form, which of the following set of conditions would you choose as being ideal for this purpose?
 - (a) High sulphur, low silicon content; slow cooling.
 - (b) Low sulphur, low silicon content; fast cooling.
 - (c) High sulphur, high silicon content; fast cooling.
 - (d) Low sulphur, high silicon content; slow cooling.

Gas for Bright Hardening Is Quite Complex

Must Be of Such Composition as to Cause no Change in Carbon Content of Steel

By F. A. Pease

New Jersey Chapter—At the April meeting held jointly with the local chapter of the A.S.M.E., H. W. Gillett presented the subject of "Furnace Atmosphere Control in Heat Treating."

The elimination of high finishing costs after the heat treatment of steels is perhaps the primary reason for the many investigations on controlled atmospheres.

Many and complex are the problems of "bright hardening" as compared with "bright annealing" of non-ferrous materials; for it is not simply a matter of using a "reducing flame" to accomplish the desired results. The CO₂ and H₂O present in a reducing atmosphere may be enough to oxidize the steel seriously even if they are accompanied by CO, H₂, or unburned hydrocarbons. Efforts to overcome this oxidizing tendency of CO₂ and H₂O by increasing CO, H₂, and hydrocarbons may cause carburization or decarburization.

Gases that can be used for the "bright hardening" of steel without causing a change in carbon content are nitrogen, hydrogen, cracked ammonia, carbon monoxide, and gas resulting from the controlled partial combustion of hydrocarbons. The latter is the most widely used.

Preparing the Gases

These gases are prepared by burning methane, propane, butane or city gas, so as to give a balanced mixture of carbon monoxide and carbon dioxide. The gas-air ratio is controlled so that most of the hydrogen is burned to water vapor; the removal of moisture is accomplished by adsorption in activated alumina or silica-gel.

The ratio of CO to CO₂ can be controlled by the chemical removal of all or a portion of the CO₂. Traces of oxygen can be removed and the hydrocarbons broken up by passing the gases over hot charcoal.

Carbon dioxide and H₂O must be avoided to obtain bright hardening of medium and high carbon steel. By removing CO₂ and H₂O from mixtures of H₂, CO and nitrogen, plain carbon steel may be bright hardened.

A nitrogen atmosphere containing a small percentage of CO can be used for practically all steels. The tendency toward decarburization may be overcome by small additions of methane.

Mixtures of hydrogen and nitrogen (cracked ammonia) are successfully used if methane additions are made in accordance with the steel used.

Alloy Steels Also Bright Hardened

Commercial gases high in CO₂ are limited to low carbon steels. Methane adjustment in such gases is not satisfactorily accomplished because of the CH₄ and H₂ reaction with CO₂, forming H₂O which will decarburize medium and high carbon steels.

Factors affecting the "bright hardening" of plain carbon steels are also applicable for alloy steels of corresponding carbon content. High chromium steels, however, are particularly sensitive even to traces of oxygen-containing gases.

The problem of "Controlled Furnace Atmospheres for Heat Treatment" is far from its final solution. Investigators can justifiably look for other raw materials and methods of gas production in the future.

Correlation of Grain Size to Physical Properties Is Revealed by the Microscope

(Continued from page 1)

physical properties. The pioneer efforts in 1922 of McQuaid and Ehn with plain carbon case hardening steels, followed by contributions from Sweden in 1926 on the properties of acid open-hearth tool steels, mark the early beginning of correlations of grain size and resulting physical properties.

Factors Regulating Al Addition

Regulating grain size by additions of aluminum is the usual practice. Some factors influencing the amounts added are: Carbon, manganese, and silicon

contents, degree of oxidation, and grain size desired.

Fine-grained material can be attained by the addition of from 1 to 2 lb. of aluminum per ton of steel. The choice of deoxidants is, however, not limited to aluminum as silicon-manganese is used for producing a coarse-grained material.

There exists some disagreement as to the precise mechanism of grain growth inhibition by aluminum additions; some consider it a purely chemical effect while others favor a theory of mechanical obstruction similar to that exhibited

by the presence of thoria in tungsten.

Variation in austenitic grain size exerts profound influence upon the physical properties of the material. Such factors as hardenability, impact resistance, resistance to creep and cold working embrittlement are examples.

The rate of austenitic grain growth is affected by the deoxidant used, coarsening temperature, time at temperature, amount of hot and cold working, and under certain conditions, by the rate of heating.

The methods described for determining austenitic grain size were: McQuaid-Ehn, gradient quenching, etching of oxidized surface, and the fracture method.

McQuaid-Ehn Test

The requirements for obtaining results with the McQuaid-Ehn test are a temperature of 1700° F. for a definite length of time and a long time cooling cycle in a carburizing atmosphere. The examination of the carburized zone reveals the resulting grain size. This practice has the disadvantage of not simulating the commercial heat treating practice with respect to maximum temperature and time at temperature.

The gradient quenching method consists of quenching in brine the tip of a specimen of suitable dimensions which has been heated to any desired temperature. In this manner a gradient of cooling rates is produced along the length of the specimen, and by etching with Picral or Nital solutions, the austenite grain size may be seen. The brine quenched tip will also show the grain size when etched with a solution consisting of 1% picric acid and 5% HCl in grain alcohol.

The Tobin-Kenyon method of surface oxidation was discussed critically and reported as practical and dependable.

The final method, that of fracturing a hardened specimen (Shepherd and Jernkontoret) was recommended as being rapid, accurate and practical.

Electrodeposition Process Applied to Fabrication and Heat Treatment of Metals

By M. J. Donachie

Springfield Chapter—The March meeting was held jointly with the American Electro-Platers Society, and was preceded by a dinner and general get-together of members of both organizations.

Guest speaker for the evening was George B. Hogaboom, engineer of Hanson-Van Winkle-Munzing Co., Maitland, N. J. "Metal Coatings" was the subject for the evening's discourse.

Mr. Hogaboom outlined the development of electrodeposits from the time of Faraday up to the present. An outline of the field of uses was given and special reference was made by the speaker to the applications of electrodeposits in the fabricating and heat treatment of metals.

Of these, the plating of metals to prevent carburizing and nitriding and plating to prevent excessive scale in heat treatment of certain parts were discussed by the speaker.

The replacement of worn metal and filling of cavities by electroplating, and the beneficial effects obtained by the use of deposited surface metal were outlined. Some very interesting specimens of machine parts which had been filled to a considerable depth with electrodeposited iron, machined and carburized, were exhibited.

The speaker went on to discuss the various types of baths for electroplating and also the cleaning technique and apparatus, the reason for using these preparations and the effect on the finished product. The discussion which followed was long and lively.

Franks Discusses Special Elements Added to Stainless

By L. F. Herron

Cleveland Chapter's annual meeting was held May 2. Following the reports of the outgoing officers, George Williams relinquished the gavel to new chairman, Hugh Brown, who introduced the speaker, Russell Franks of the Union Carbide and Carbon Research Laboratories, Niagara Falls, N. Y.

Mr. Franks opened his talk with a description of the difficulties first encountered with the 12 to 15% chromium rustless irons in fabrication service because of inherent coarse grain which is due to chromium straining the carbon from function in refining treatments.

He then illustrated the efficiency of nitrogen additions in producing fine-grained product now available in this type of material. The beneficial effect of sulphur additions on machinability were also mentioned.

In swinging over to the 18-8 type of steels Mr. Franks told of difficulties due to intergranular corrosion under certain conditions, and of many experiments with stabilizers resulting in the use of columbium and titanium. The former is particularly advantageous for welding.

Mr. Franks advocated six to ten times as much columbium as carbon depending on severity of service, and showed the advantage of a weld metal more noble than the base material.

He covered the problems of pitting and contact corrosion, and the conditions desirable for testing, and showed the additional benefits of molybdenum additions to the chromium-nickel types. In closing he suggested for the utmost in stability about 1% of columbium with 2 or 3% molybdenum, and an appropriate increase in nickel made necessary by the molybdenum.

E. H. Johnson of Republic took the stand during the discussion and suggested that if the users of stainless should accord it more care than is customarily given, they would be well repaid in performance.

E. E. Thum, who was then invited to speak, said he was afraid some of the audience would think that stainless was subject to many disadvantages and pointed out the poor performance of other alloys under specific conditions which they are apt to encounter.

Answers to Quiz Questions

- (b) Segregated areas that are rich in phosphorus.
- (c) The body-centered lattice structure of alpha iron is not as dense as the face-centered lattice structure of gamma iron.
- (d) Edgar Collins Bain.
- (c) Yellow to pale brown.
- (c) The copper percentage increases in both phases.
- (a) A name for the condition of steel when made up wholly of troostite.
- (b) Austenitic nickel steel.
- (b) Twentieth.
- (c) Sailor.
- (d) Low sulphur, high silicon content; slow cooling.

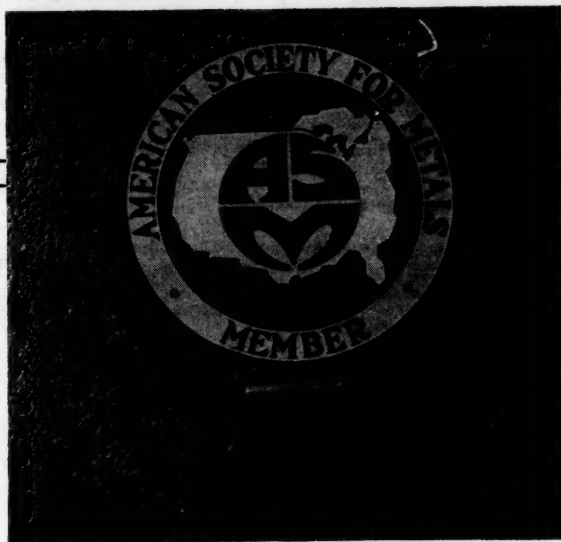
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